

Experiment s. astronomy + iron

Acc. 976

Aurora + sunspots

Paper to start Engineering School.

Frid, Feb. 17, 1870.

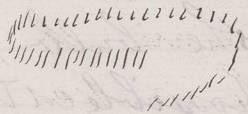
P.S. with the diagonal eyepiece I can throw the light on a piece of paper + draw ~~it~~ the sun directly, instead of copying it. If I can, I am going to make (in the holidays) a desk that will rise to any height + incline to any angle, + then I can throw the

Dear George

I received safely that mirror which you sent, + I am going this afternoon see about getting it fitted up. In regard to what you said about cracking it, + fusing the silver, ~~let me~~ I may say that the beam of light that comes on it from the objective is about  $\frac{3}{4}$  of an inch in diameter, + when I tried the experiment with the thermometer I allowed the ~~let~~ light to fall on the bulb where it was as nearly as possible the diameter of the bulb; or rather, I held the bulb at such a distance from the object-glass that its diameter was equal to the diameter of the pencil of the light; so that the heat would act all over



the bulb. The reason the <sup>dark</sup> glass  
of ~~the~~ was melted, was that  
the light was focused to an absolute  
point on its surface, whereas when  
it falls on the mirror it is about  
 $\frac{3}{4}$  of an inch in diameter as I  
said before. But notwithstanding  
you may be shure that I will  
take the utmost care I can, not  
to allow any accident of the  
kind to happen to it.

On the 10<sup>th</sup>, 11<sup>th</sup> & 12<sup>th</sup> of  
this month there were very fine  
auroras. On the 10<sup>th</sup> especially, there  
was a splendid display about 11 o'clock  
It was towards the north & consisted  
of perpendicular streamers, not long,  
but side by side in a long ~~line~~  
elliptical line somewhat thus: -  
of course it changed  
very much. On the  
12<sup>th</sup> the sky was  
  
covered with thin stratus, & only the  
stars of the 1<sup>st</sup> & second magnitude  
were visible, but yet the aurora  
was visible enough for one to  
know that it would be very fine



if ~~the~~ the sky had been clear.

It was radiating from the zenith  
on two of the nights, & irregular  
on the other. About the same  
time a great many large spots  
came round on the sun. I have  
noticed that when a number of  
large spots <sup>are</sup> coming round they produce  
that aurora is seen, but when  
they are round (i.e. when they are  
fairly on this side of the sun)  
that they cease. It would seem  
as if their coming round disturbed  
the electric equilibrium (if electricity  
is the cause) & but when they  
are fairly round the equilibrium  
is again restored, but at a higher  
level so to speak. But when  
they leave this side they no aurora  
(so far as I know) is ~~pro~~ seen.

There are at present 3 spots visible  
to the naked eye.

I was very much interested  
by some of the articles ~~at~~ in  
the last "nature". Did you read  
that article about the strength  
of cast iron at different temper =



atures? He tried breaking some bars of cast iron at  $60^{\circ}$  & at  $12^{\circ}$  & found that at  $12^{\circ}$  they were 3.5 per cent stronger. It would be interesting to have similar experiments tried ~~at~~ in this country at  $-28^{\circ}$  &  $-40^{\circ}$  (as they it was at Quebec) & see if the same law held true at those temperatures; for certainly it <sup>should be</sup> seems as if rails & wheels ~~were~~ made more brittle by the cold. But at least the ground is very hard & not so elastic as in the summer, so that a sudden bump off one rail onto another would be more likely to produce a fracture either in the rail or the ~~at~~ axle of the wheel; for the jerk would be more sudden against the hard ground even supposing the iron of the same strength.

Papa has hopes of being able to start an engineering school next session. But he will probably sell you of this himself. Yours Truly, William.